

Development and Evaluation of an Interactive WebQuest Environment: "Web Macerasi"

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ABSTRACT

This study was conducted to develop a web-based interactive system, Web Macerasi, for teaching-learning and evaluation purposes, and to find out the possible effects of this system. The study has two stages. In the first stage, a WebQuest site was designed as an interactive system in which various Internet and web technologies were used for infusion of technology into teaching and learning process. The Web Macerasi site was used for project work by 92 prospective students who attended different courses in different years. For collecting the students' perceptions about the implementations of the system, a questionnaire of WebQuest effectiveness and a focus group interview guide were developed. Next, the first phase of the study was concluded, and the WebQuest system was updated based on the data gathered from students. In the second phase, 27 students from a different course used the system, and their perceptions were collected through the questionnaire and analyzed. It was found that the students favored the technology-supported media, were more willing to collaborate, found the feedback very useful, and agreed on the positive contribution of planned works. Consequently, the Web Macerasi site was found to be successful and to have been used effectively in terms of its aims. Further studies should be carried out for diffusion of this technology into the teaching-learning processes.

Keywords

Technology integration, Media in education

Introduction

Technology is used in education for two main reasons: as a tool for increasing the effectiveness of instruction and to integrate technology into the curriculum. Researchers are trying to answer the questions of how technology should be integrated and what the effect of this process will be on various dimensions of the teaching-learning process. One possible answer to this question is WebQuest. WebQuests are inquiry-based activities through which students interact with resources on the Internet (Dodge, 1995). They are structures that aim to support student works based on application with technology. The many reasons to use WebQuests include the construction of collaborative activities, the improvement of critical-thinking skills, the enhancement of motivation, the development of social skills, and the chance of concrete, hands-on experience (Leahy & Twomey, 2005). March (1998) reported that WebQuests were designed to bring together the most effective instructional practices into one integrated student activity. Many studies have been conducted to explore the benefits of using WebQuest in theoretical terms. Zheng and his colleagues (2005) concluded that WebQuests have four constructs: critical thinking, knowledge application, social skills, and scaffolded learning. On the other hand, March (1998) grouped these constructs under just three headings: student motivation and authenticity, developing thinking skills, and cooperative learning.

WebQuest, which makes students access the web to complete a task or solve a problem, elicits higher-order thinking rather than simple information searching and recall. These tasks should involve problem solving, judgment, synthesis, and analysis of information. Perkins and McKnight (2005) explained one of the benefits in the following words: "In the process of problem solving, students learn skills in an interactive, involved manner rather than in isolation" (p. 124). Moreover, Abu-Elwan (2007) added that, in order to develop students' skills, WebQuests provide an authentic, technology-rich environment for problem solving. March (1998) stated that a WebQuest forces students to transform information into something else: a cluster that maps out the main issues, a comparison, a hypothesis, a solution, etc. Vidoni and Maddux (2002) stated, "WebQuests challenge students' intellectual and academic ability rather than Web searching skills" (p. 104). Regarding the finding of valid resources, Perkins and McKnight (2005) explained, "Students have to evaluate the sites that are used for useful information while eliminating misinformation. This helps students develop their critical-thinking skills" (p. 124).

March (1998) explained that "By running several WebQuest groups in the same class, students will also see that different solutions were chosen by each team because of the quality of the group members' research and

argumentation skills” (p. 15). In addition, Kundu and Bain (2006) stated, “While, as a group, students who undertake a WebQuest interact and work together, each group member carries out a specific, meaningful role” (p. 7). As Lightner, Bober, and Willi (2007) mentioned, “Member responsibilities are social, not merely academic, such as providing support, encouragement, and assistance in completing assignments and meeting course requirements” (p. 13). Moreover, Lacina (2007) added that “WebQuest allows students to work cooperatively to learn and exchange new information while using technology that provides the multiple forms of information needed to understand a new topic” (p. 251).

WebQuests are the right choice for implementing problem-based and inquiry-based instructional activities because of the fact that project-based learning promotes engaging instructional methods to make students active constructors of knowledge (Grant, 2002). Projects may or may not be problem-based or inquiry-based (Lowry & Turner, 2005), but in any case WebQuests are eligible platforms for carrying out the projects.

An interactive WebQuest environment: “Web Macerasi”

Generally, teachers have been designing static WebQuests that contain web pages but no interaction for directing both short-term and long-term projects. However, by taking advantage of technology, it is possible to use these kinds of platforms more functionally and provide an interactive environment for the process of guiding a project in order to manage the quests. The core of this study, which began with a question about how to use WebQuests more effectively, is to design, develop, and put into practice interactive WebQuests for teachers and students (Gülbahar & Madran, 2006). By using this interactive environment, teachers can perform operations such as creating WebQuests, updating existing WebQuests, evaluating the performance of students who enrolled in any WebQuests, and accessing other, previously published WebQuests. The flowchart of this interactive environment is shown, without going into detail, in Figure 1.

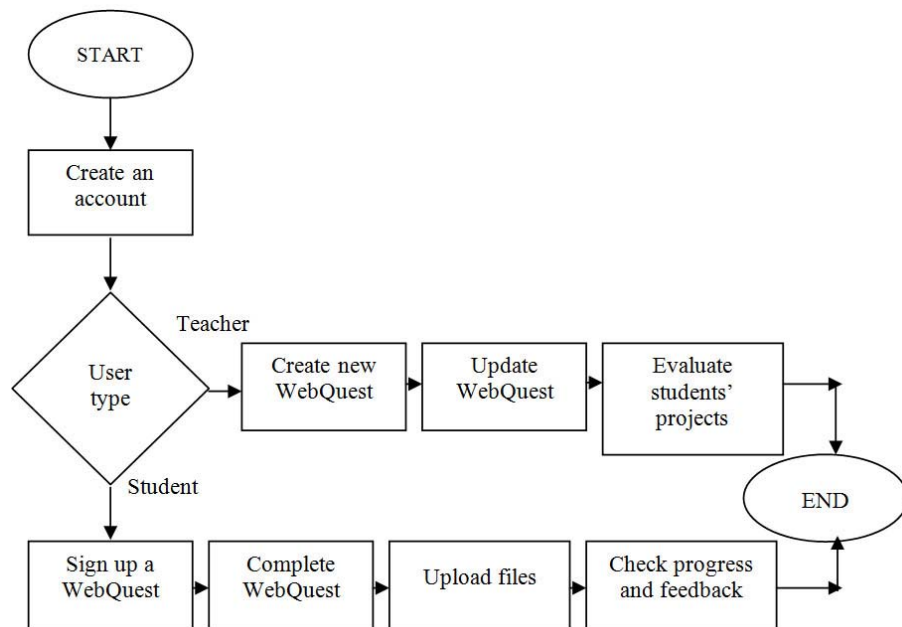


Figure 1. Flowchart of interactive WebQuest

These web pages were organized to write WebQuests steps (introduction, task, resources, process, evaluation, and conclusion) and other details (task type, evaluation preferences, creating rubrics and deadlines for each step, etc.) (Dodge, 1997; Kundu & Bain, 2006). In this approach, PHP and MySQL technologies were used to introduce interactivity to WebQuests. The WebQuest system (<http://webmacerasi.midas.baskent.edu.tr/>), including detailed documents and examples about WebQuests called Things to Learn about WebQuests, Join WebQuest (for students entering WebQuests) and Create WebQuests (for instructors creating WebQuests) can be accessed from the first page of the system. Users can write their questions and comments through the “central office.”

To join a WebQuest and to create a WebQuest, students and instructors have to start the procedure of getting a “passport” by filling out an application form. After the site administrator has approved their application for a passport, they can enter the site by supplying a user name and password. The navigation bar on the top right side of the WebQuest system includes all operations for WebQuest (Figure 2).



Figure 2. WebQuest navigation bar

With the Create WebQuest option, instructors can create WebQuests for students to follow their own projects step by step. Instructors can write the steps of the WebQuests in a text editor, providing detailed options to the users. After completing all the steps of the WebQuests, instructors can define each task in the Process part so that while students follow the due date of their homework and upload their files, instructors can access the files, grade homework, and provide feedback. It is also possible to provide students with the ability to create WebQuests through the Create WebQuest option base upon user restrictions.

Students can enroll active WebQuests in the system by clicking Join WebQuest. Moreover, the Communication option allows students to send messages to each other and to the instructors. Users of the system can perform detailed searches with the Search option. The Information option allows users to change, update, and view their passport information, upload avatars, and change passwords. Help provides information on the various buttons' functions, and Exit will log users out of the system.

This research study was conducted in order to design and develop the previously mentioned interactive WebQuest environment called Web Macerasi, which can be used for both instructional and evaluation purposes, and to evaluate its effectiveness upon implementation.

Research method

The purpose of this study was to develop a system, Web Macerasi, for bringing interactivity to the WebQuest approach and to evaluate the system both quantitatively and qualitatively. For this reason the study was carried out in four main steps: analysis and design, development, implementation, and evaluation. The last two steps, implementation and evaluation, have been repeated and the research is completed. Thus, the study will be presented in two phases.

The convenience sampling method was used, as random sampling was not convenient for this research (Fraenkel & Wallen, 2006). That is, users were selected in terms of their availability and therefore this study is a case study.

The study investigated the following questions:

1. What is the level of participants' agreement on the Likert-type scale about the WebQuest site design in terms of general design, grammar, navigation, and technical problems?
2. What is the level of participants' agreement on the Likert-type scale about the steps of WebQuest project in terms of introduction, task, process, resources, evaluation, and conclusion?
3. What are the perceptions of participants towards working with WebQuest projects in terms of planning skills, problems faced, implementation, real-life experience, popular and unpopular features, suggestions, and integration ideas?

Procedure

In the first phase, analysis and design steps were completed. In other words, the content of the Web Macerasi was determined and prepared, a detailed literature review of projects was conducted, and flowcharts and storyboards for the system were completed. Parallel to this work, supplementary documents and sample project ideas that would serve as guides for the WebQuest approach, descriptions of the WebQuest approach, sample projects, and instructions for system usage were created. After creating the content, the interactive WebQuest system, Web

Macerasi, was developed. The system was used to carry out projects in different classes. In order to create a difference between the projects, durations ranged from one week to three weeks, and the number of tasks ranged from two to six (Gülbahar, Kalelioğlu, & Madran, 2008a). After implementation of the system, the Effectiveness of WebQuest Application Questionnaire was administered to the participants, and focus group interviews were conducted according to the interview guide.

Regarding the students' views on improving the system, a few amendments were made in the system. The demands of the students relating to the aims of the site were taken into consideration. Firstly, visual modifications were made as the students mostly focused on visual messages. Secondly, a visual message was included as an alert that shows the finished tasks. In addition, a link that shows a "hint for detail" was placed on the site in order to increase accessibility of support documents. After that, the modified system was implemented with another group, and the Effectiveness of WebQuest Application Questionnaire was administered again as the second phase of the study.

Sampling

The first phase of the study was conducted in three courses from two different departments in the educational faculty of a private university. These courses were Computer Programming I, offered by the Secondary Science and Math Education Department (SSME) for freshmen; Applications of Authoring Languages in an Internet Environment, offered for juniors by the Computer Education and Instructional Technologies Department (CEIT); and Design, Development, and Evaluation of Educational Software, offered by the same department for seniors. For each course, different projects related to the course content were provided.

In total, 92 pre-service teachers, including 59 women (64%) and 33 men (36%) participated in the first phase of the study. Thirty-two (35%) of these were freshmen, 38 (41%) were juniors, and 22 (24%) were seniors. In terms of departments, 59 students (64%) were from the CEIT, and 33 students (36%) were from the SSME. The students varied in age between 17 and 30, and the students' mean age was 22.06. All but one of the students had a computer at home. Of the participants, 69 (75%) had used computers for more than four years, 15 (16%) had used computers for three to four years, 7 (8%) had used computers for one to two years, and one (1%) had used computers for less than a year. While 69 (75%) of the participants had not completed any WebQuest project before, 23 (25%) of the participants had.

The second phase of the study was conducted in a sophomore course called Teaching Principles and Methods, offered by CEIT. Twenty-seven students, 12 women and 15 men, enrolled in this course. Completion of a four-week WebQuest project called "How learning occurs?" was required for students in this course.

Instruments

Both qualitative and quantitative measures were established for the research project. For collecting data relating to WebQuest, the Effectiveness of WebQuest Application Questionnaire was used. Analyses were made after piloting validity and reliability. Content validity was ensured through obtaining views of three experts. After taking the concerns of the experts, we modified the questionnaire and sent it back to the experts until the last version was achieved. In order to reveal the different dimensions of the research process and its outcomes, focus group interview guides were prepared.

The Effectiveness of WebQuest Application Questionnaire (EWAQ)

The Effectiveness of WebQuest Application Questionnaire (EWAQ), which was composed of four main parts and 72 questions, was developed and used to collect quantitative data for this study. This questionnaire was developed by the researcher according to the items used in the previous research studies about website evaluation instruments and WebQuest evaluation rubrics (Dodge, 2001; March, 2002; Lara & Repáraz, 2005; Vanguri, Sunal, Wilson & Wright, 2004). For the content validity, three expert opinions were taken into consideration.

The first part of the questionnaire consisted of nine items for eliciting demographic data about participants. The second part of the questionnaire consisted of 22 items concerning the general design of the WebQuest site, in which

there were ten items for general design ($\alpha = 0.85$), four items for grammar ($\alpha = 0.56$), four items for navigation ($\alpha = 0.66$), and four items for technical issues ($\alpha = 0.78$). The third part of the questionnaire consisted of 19 items concerning the steps of the WebQuest project, in which there were four items for the introduction ($\alpha = 0.73$), four items for task ($\alpha = 0.72$), four items for process ($\alpha = 0.61$), four items for resources ($\alpha = 0.71$), four items for evaluation ($\alpha = 0.65$), and three items for the conclusion ($\alpha = 0.67$). There were 18 items in the last part of the questionnaire, addressing general thoughts about working individually and in a group on WebQuest projects ($\alpha = 0.93$). All the items in this questionnaire used a five-point, Likert-type scale, where 5 was coded as strongly agree, 4 as agree, 3 as neutral, 2 as disagree and 1 as strongly disagree. Item 14 was reverse-scaled before going through the steps of the analyses. The reliability coefficient was calculated as 0.95 overall for the questionnaire.

Focus group interview guide

To obtain detailed data and the personal views of participants relating to WebQuest, structured focus group sessions were conducted. For the interviews, juniors were selected due to their large number. The focus group sessions last between 40 and 60 minutes with four to five participants in each session. The interview guide consisted of eight questions, as follows:

1. In what way has WebQuest affected your working in a planned and regular manner? Please describe.
2. Have you encountered any problems in carrying out WebQuest projects? If so, please specify.
3. Do you think you will make WebQuest projects in the future? If so, please list the reasons why.
4. To what extent could this project help you to solve similar problems you might meet in real life? Why and how?
5. List three characteristics of WebQuest that you like.
6. List three characteristics of WebQuest that you do not like.
7. Which items could be included in the WebQuest site to contribute to effective usage of WebQuest? Please write your recommendations.
8. Please express your opinions related to the use of WebQuest to support project-based teaching (a. In terms of contributions to instruction; b. Other).

Data analysis

The quantitative data were analyzed by descriptive analysis methods, and the qualitative data were analyzed by content analysis. The aim of content analysis is to discover concepts and relations that may explain the data. Therefore it is necessary to find themes that define the data, and to conceptualize and organize them in a logical manner (Yildirim & Şimşek, 2000). An inductive approach is used for determining the concepts and relations that explain the data. Regarding all these facts, the data were analyzed in 4 phases: (1) coding data, (2) finding out themes, (3) organizing and defining data according to themes, and (4) interpreting results (Yıldirim & Şimşek, 2000). In addition, the data were changed into figures for making comparisons among the themes in the analysis of the qualitative data (Yıldirim & Şimşek, 2000). The themes were analyzed according to their significance levels. The figured data were used in the presentation of the data.

Results

Perceptions about the design of the website

There were items that inquired into the general design, spelling, navigation, and technical problems of the WebQuest. The results of the questionnaires for both the first and the second phase are presented in Table 1.

The mean of satisfaction with WebQuest for both groups is about 4.00, which mean that both groups were satisfied with WebQuest. There is no significant difference between the two groups' means, but the group that participated in the second phase seems to have scored a little lower than did the first group. This difference might be due to the number of participants.

Table 1. Perceptions about the design of website

	PHASE I (N = 92)		PHASE II (N = 27)	
GENERAL DESIGN (Please answer according to the pages existing in the website.)	Mean	St. Dev	Mean	St. Dev
Screen design is visually appealing.	4.30	0.69	4.04	0.94
Visuals are consistent with content.	4.47	0.60	4.26	0.71
Visuals give cues to users.	4.40	0.66	4.11	0.85
Screen is used in an effective manner.	4.46	0.68	4.04	1.02
Colors used within the pages are in harmony.	4.58	0.65	4.11	0.97
Web pages are designed according to visual design principles.	4.45	0.60	4.15	0.77
No readability problem within the pages.	4.67	0.59	4.33	0.73
Page elements are aligned appropriately.	4.58	0.73	4.48	0.58
Elements are distributed in the pages in a balanced way.	4.52	0.58	4.30	0.72
Clickable areas gain attention.	4.17	0.88	3.89	1.12
GRAMMAR (Please answer according to the <u>content</u> presented in the website.)				
No spelling mistakes exist.	4.27	1.01	4.11	1.05
No grammar mistakes exist.	4.43	0.78	4.11	0.97
Language used is understandable.	4.28	1.11	4.26	0.94
Technical expressions, which are difficult to understand, are used.	2.30	1.29	2.74	1.45
NAVIGATION (Please answer according to the pages existing in the website.)				
No broken links exist.	4.33	1.02	4.15	1.23
Links open in separate pages.	3.51	1.38	3.96	1.09
Navigation options are used consistently within the pages.	4.30	0.84	4.37	0.79
Site navigation is easy.	4.47	0.83	4.33	0.78
TECHNICAL PROBLEMS (Please answer according to the pages existing in the website)				
Pages download quickly.	4.24	0.81	3.81	1.39
Pages can be used without additional plug-ins.	4.45	0.80	4.26	0.81
Files upload without any problems.	4.43	0.88	3.93	1.23
Pages operate without any errors.	4.50	0.85	4.19	1.00

Perceptions about steps of the WebQuest project

In order to collect their views on the steps of their projects in terms of WebQuest, we asked participants questions that inquired into every step. The means and SD are presented in Table 2. It is normal to obtain different results for the theme, period, and steps of the projects that were delivered to every group. But most of the means are about 4.00, which is significant. There is no significant difference between the processing and progressing steps. The students who participated in the second phase had difficulty with resources. One of the important problems the students met was inadequacy of Turkish web resources in the implementation of the project, as the searches recommended foreign resources. There are no significant differences between groups with regard to results and evaluation. We conclude that almost all of the students' attitudes were positive.

Table 2. Perceptions about steps of the WebQuest project

	PHASE I (N = 92)		PHASE II (N = 27)	
INTRODUCTION	Mean	St. Dev	Mean	St. Dev
Introduction presents goal of project.	4.21	0.91	4.07	0.78
Topic of project is appealing.	3.84	1.26	3.04	0.98
Introduction gives enough concrete information about the project.	3.98	0.89	3.89	1.01
Project's scope is consistent with learning outcomes of the course.	4.23	0.85	3.89	0.93
TASK				
In the task section, project expectations are clearly explained.	4.16	0.90	4.19	0.83
Project requires interpreting knowledge in various forms.	4.29	0.87	3.81	0.83
Developing a creative product is expected for completing the project.	4.11	0.98	4.00	0.83
The roles and tasks within the project necessitate different points of view.	4.22	0.85	3.89	0.89
PROCESS				
Stages of the process are organized so that they can be accomplished	3.87	1.19	3.93	1.07

during the allocated time period.				
Each stage is explained in a clear and definite manner.	4.02	1.08	4.00	1.24
Students can request help from the instructors when they face a problem during the process.	4.41	0.82	4.07	1.14
Stages of the process are organized according to various levels of Blooms' taxonomy.	4.22	0.90	4.30	0.72
INFORMATION SOURCES				
Enough information is provided to complete the project.	4.13	0.93	2.89	1.15
Web addresses are given with extra information that defines site.	4.30	0.86	3.89	0.97
Information sources are consistent with project topic.	4.51	0.60	4.07	0.87
Information sources are appropriate for target students.	4.26	0.82	3.22	1.22
EVALUATION				
Grading of each task was clearly defined.	4.53	0.80	4.48	0.64
Grading was consistent with difficulty level of each task.	4.04	1.01	4.19	0.83
Students have the chance to get feedback and performance reports.	4.46	0.77	4.26	1.02
Evaluation criteria are consistent with course objectives in terms of information and skills.	4.27	0.75	4.15	1.02
CONCLUSION				
Conclusion summarizes students' experiences during the process.	4.32	0.82	4.19	0.78
Messages in conclusion aim to prepare students for real-life situations.	3.91	0.91	3.63	1.04
Messages in conclusion give clear explanations to students about how they are expected to succeed when they finished the project.	4.20	0.82	4.04	0.98

Perceptions about WebQuest project

A five-point Likert-type scale was administered to participants to find out what they experienced during the project. The results showed that the students preferred collaborative activities. The students merely indicated that they showed "respect to other participants' thoughts during completing the project" ($M = 4,64$ and $M = 4,63$).

The "I have not encountered any problems with finishing my project" response had the lowest value ($M = 3,25$) among participants of the first phase, whereas "WebQuest contributed to my desire to collaborate with others" had the lowest value ($M = 3.15$) among participants of the second phase (See Table 3). This means that the first group had a timing problem while the second group had a collaboration problem.

Table 3. Perceptions about the "WebQuest" project

	PHASE I ($N = 92$)		PHASE II ($N = 27$)	
	Mean	St. Dev	Mean	St. Dev
This project oriented me to research.	4.08	0.99	4.07	1.07
I didn't have problems due to time limitations while completing the project.	3.25	1.50	3.63	1.36
I think I am suitable for group work.	4.17	1.09	3.89	1.25
I didn't need any help from the instructor during the project.	3.35	1.36	3.52	1.31
I valued the contribution of members of the WebQuest project.	4.36	0.77	4.11	0.80
I shared information with other participants.	4.20	1.06	3.85	1.06
I showed respect for other participants' opinions during the project.	4.64	0.52	4.63	0.49
I generated creative ideas during the project.	4.32	0.85	4.04	0.64
I helped other participants find their mistakes.	3.79	1.16	3.37	1.04
I completed the WebQuest project easily.	3.78	1.18	3.59	1.24
The WebQuest project encouraged me to collaborate with other participants.	3.83	0.97	3.15	1.26
The WebQuest project made me use my imagination.	3.85	1.18	3.37	1.33
WebQuest increased my skills in applying recently learned concepts to my profession.	3.82	1.14	3.37	1.04
Contributing to WebQuest increased my motivation in the course.	3.80	1.19	3.67	1.11
WebQuest supported my understanding of course-related topics.	3.71	1.12	3.81	0.88

WebQuest was effective for reaching the goals of the course.	4.08	1.01	3.89	0.93
Project-based learning is more efficient than individual work.	4.10	1.09	3.59	1.08
I liked having web support for this course project.	4.35	0.95	4.19	0.74

Focus group interviews

Focus group interviews were conducted with junior students of the Department of Computer Education and Instructional Technologies, since there were problems in terms of accessibility to senior students. Interviews were conducted with 34 of 36 students. The perceptions of the students are presented in the same order as that of the questions.

Perceptions about working on the WebQuest project in a planned and guided way

At first, the participants were asked about how they were affected by working on the WebQuest project in a planned and guided way. Nineteen participants expressed that the planned step-by-step progression characteristics of the project created an appropriate approach and that that was beneficial for them in some respects. Concerning the topic, one of the participants said, "Segmented time is definitely better." Another participant explained that clearly disclosing the project's requirement and goals prevents it from being sophisticated, and another participant stated his opinion that "if it is somehow planned, it gives us relief." Yet another participant stated that if they do not study in a planned way, the project is deferred to the last day of submission, details are omitted, and there are deficiencies in the final product.

The participants stated that, in general, they did not study in a planned and disciplined manner. Hence, for this study, they had to have a schedule imposed on them. Even though students in higher education are expected to be more intrinsically motivated, their need to be extrinsically motivated can be interpreted as a reflection of their unawareness of their vocational careers. To conclude, even at a higher education level, it is correct to carry out project-based instruction over a long period divided into processes based on days and weeks, bound to the calendar.

Perceptions about the problems participants encountered during the execution of their WebQuest project

The second question was related to difficulties participants encountered while conducting their projects. Five themes emerged from the data obtained from this question. These themes were as follows: deficiency of information about the system, difficulties in meeting of groups, time concerns, difficulties related to user login, and difficulties uploading files.

- Giving extra time to allow students to become familiar with the site may solve the first problem. Since students may not have been skilled enough in the application, and since there were time constraints, students were confused.
- Concerning the second problem, examination of the data revealed that the problem occurred in three different groups. We suppose that the reason for this problem might be lack of extra time for group construction. This problem also occurs in group work in conventional education, as the group members may not get together due to various reasons. Thus, as with the first problem, giving extra time will probably help solve this problem.
- About scheduling, some participants stated that they had difficulties because the projects for other courses were mostly conducted at the end of the semester, whereas some pointed to the limited time between the phases of the project. Separation of project stages into longer time intervals and planning long-term projects may help overcome this obstacle and may enhance the quality of the product.
- Entrance into the system, registration, and confirmation were the problems collected under the title of problems about user logins. After asking additional questions and further investigating the system, we saw that time limitations and hurrying resulted in some typing errors, which caused the students to encounter these problems.
- Lastly, the problems mentioned by the participants related to uploading assignments were as follows: (i) uploading only zip files, (ii) erasing previous files when a more recent one was uploaded for the same task, (iii) not showing the deadline of the task, and (iv) not noticing that the last uploaded file was an updated version of a previous file. At this point, allowing various file formats to be uploaded onto the system and assigning version features to the uploaded files may cause similar problems.

Perceptions about designing WebQuest projects in the teaching profession

With regard to the question of whether or not participants want to use WebQuest in their future profession, 32 participants expressed that they wanted to use it for different purposes whereas four did not want to use it. Although participants gave different responses, the reasons for usage were as follows:

- to encourage students to study systematically and on time
- as an alternative method for considering the interests of students
- to encourage the use of computers and technology
- for assessment
- to encourage group work
- to inform and provide feedback to students related to their homework and assignments
- to collect all the assignments together in the same space

Generally, we found that most of the participants were in favor of using WebQuest in their teaching profession. The fact that participants wanted to use the system in their future profession might be seen as an indicator of a positive attitude toward the system. However, availability and suitability of technical features of Web Macerasi were found to be crucially important for the use of this system.

Perceptions about the contribution of the WebQuest project to real-life problems that may be encountered

When the participants were asked about the project's contribution to their lives, we realized that they could not use foresight to establish a connection between their experience and their real lives. Six of the participants stated that they gained new perspectives and could empathize with other participants by the help of the roles given. Hence, dealing with the same problem by looking at it from different perspectives enhanced students' views while approaching and creating solutions to the problems they face. One student said, "at least it enables us to think from multiple perspectives...we can think differently from all aspects." Another said, "We could understand how things differ according to different people during this WebQuest project." In addition, one participant emphasized this situation by summarizing the fact that "when we put ourselves in each role, we actually noticed the difference. This will enable us to examine things from multiple perspectives when we encounter a problem in our daily lives." Moreover, one explained its contribution in terms of supply and demand, as it enabled empathy to understand the expectations of different people. Two participants stated that they now have knowledge that will be useful when they encounter similar situations in their lives, and four stated that they gained experience in design and evaluation. Based on these results, we can conclude that the roles in WebQuests can yield positive outcomes and that time restrictions can lead students to learn how to plan their studies.

The top three features of the WebQuest site and project

When the participants were asked which three features of the system they most favored, the results showed that both the design and the WebQuest method itself were favored by the students. Seventeen participants stated that they liked the colors, content and usability of the website. One said, "For me, the design was great, attracting my interest and emphasizing the purpose as research." Sixteen students valued the representation of objectives, availability of sources, the step-by-step procedure for the project, and deadlines for assignments. Some participants (12 students) stated that uploading files and receiving feedback from their assignments was very useful. Nine participants also stated that the roles helped them to empathize with others and increased their creativity. One said, "The representation of the grades was very good, as also was the registration process." Another said, "The formation was very good. WebQuest attracted our interest. I mean, the name was really attractive." Based on the fact that students valued both the content and the system, we can conclude that the interactive WebQuest approach is a good approach.

The three least-favored features of the WebQuest site and project

Few opinions emerged when the participants were asked for their three least-favored features of the system. Moreover, it can be said that there were no big problems, so the system does not need a major change. However, some minor changes might be implemented in order to increase the effectiveness of the system. Seven participants

explained the need for deadline extension for the tasks, six participants stated the need for clearer directions, and four participants emphasized the need for a platform for interaction with others. As there were few answers on this topic in the study, it might be said that the system was generally valued.

Suggestions to improve the effectiveness of the WebQuest site

Participants were asked to share their suggestions about making the system more effective, and numerous demands were noted. Since this study is a case study and user preferences were important, all suggestions made were taken into consideration, even if stated by only one participant. The suggestions made by the participants are listed along with the number of participants who made the suggestion:

- present communication tools (forum, chat, etc.) (14)
- add illustrations, graphics, and animation (12)
- provide an information system via email (such as “evaluation completed,” “files uploaded,” etc.) (5)
- present detailed help and add a video introducing the system (4)
- provide opportunities to change colors on page, project, or task (4)
- support different file extensions (such as .zip and .rar) (4)
- provide opportunities to share uploaded files (4)
- provide information about completion of tasks (3)
- allow instant confirmation of applications (2)
- use visual effects for unused buttons (2)

These data showed that all suggestions were about technical features that could contribute to the effectiveness of the system. Thus, the system could be enhanced by taking these concerns into consideration.

Perceptions about supporting a project-based teaching method via the web

In general, participants expressed positive thoughts about supporting a project-based teaching method in a web environment. Concerning the WebQuest approach to providing Internet resources, seven participants said that they felt confident when resources were provided by the instructor, and that they were prevented from getting lost in the Internet environment while researching and directed to research. Five of the participants stated that the points offered for the projects affected the time allocated for working on the project and the quality of the products created, respectively. Three participants emphasized the need for more Turkish resources. The fact that submitting the project in a web environment decreases cost was found favorable by two participants. One participant stated, “In my opinion, I can access the directions 7 days a week, 24 hours a day. This is a big advantage. Which task will be completed is clear. Very good.” Providing project content from the web environment and offering use of web resources were favorable results.

Discussion

WebQuest, which is an alternative assessment tool in higher education, provides a base that makes it possible to implement a project-based instruction method and helps teachers to integrate technology into the curriculum. Web Macerasi aimed to make the system interactive and easily usable for students and academic staff. The study attempted to develop a WebQuest system for use in different courses and to evaluate its results.

The study was carried out in two phases and was implemented in two terms, starting in the 2006–2007 spring term and finishing in the 2007–2008 fall term. As a limitation to this study, the sample size of the second phase was very small. The findings of the study were very positive. Participants considered the design, grammar, navigation, and technical problems adequate. Participants assessed the content and the steps of WebQuest projects positively. The comments of the students on process demonstrated that they preferred collaborative activities.

Regarding the topic and duration of each project, participants stated different views. However, when we distinguish between the project content and the interactivity of the web-based approach, we found that when the right choices of project topic were made and enough resources were supplied, participants were pleased to use such a technology-rich

environment in order to carry out their projects. Many students asked for the repetition of similar projects and agreed to continue with those projects. Thus, the way technology was integrated into the curriculum can be said to have been effective (Gülbahar, Kalelioglu, & Madran, 2008a). Furthermore, the usability evaluations were carried out through a heuristic walkthrough method by help of five students and five academics and revealed that both two groups finished the process with a success rate of 75%. Hence, suggestions for enhancing usability were as follows: informing the users on a theoretical basis, using different concepts for some processes, and providing extra links relating to some procedures (Gülbahar, Kalelioglu, & Madran, 2008b).

Conclusion

The results of this study that contributed to the effective usage and integration of technology into education were as follows:

- The project-based method encouraged students to finish their obligations on time and make them work in a planned way.
- The Internet and web technology-supported project-based method has a positive impact on students.
- Carrying out projects using a web-based system provides the students with learning-by-doing activities and constitutes examples in technology integration.
- Supporting project-based teaching by Internet and web technologies makes the academic staff organize assessment schemes and realize objective assessment.

The results of this study, whose overall sample was 119 students, proved that different technology-based methods should be used extensively in education. Ordinary use of technology is insufficient for students, but systems like Web Macerasi allow students to perceive technology differently. Furthermore, these media facilitate different collaborations among virtual groups and the strict timing of the projects makes students take responsibility.

The next phase of this project should focus on effective usage and on broadening the project's scope. Different approaches to technology-based instruction and assessment should be studied. Possible study themes are as follows:

- the potential impact of WebQuest projects on elementary and secondary education
- evaluating different approaches to WebQuest; for instance, similar systems for electronic portfolios might be developed and studied.
- the potential enrichment of technology-based implementations for different instructional methods. Collaborative learning activities might be carried out by technological infrastructure; students' attitudes towards these systems could be studied.
- the impact of the interactive WebQuest on students' study habits or on their success rates

In addition, the following questions can also be considered for further research:

- What is the impact of the instructional methods that were supported by the interactive WebQuest environment on the study and research skills of the students?
- What is the impact of the instructional methods that were supported by the interactive WebQuest environment on the study on the retention rate?
- To what extent does Web Macerasi contribute to the promotion of social skills and critical thinking in students?
- What are the perceptions of the instructors who use Web Macerasi?
- What are the effects of completing a Web Macerasi project on students' higher level thinking skills?
- What are the effects of completing a Web Macerasi project on students' interaction, group work and cooperative learning?

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